Mastering with Sound Tools™

How to go from Session to CD in a Few Easy Steps

The technology to master and produce compact discs used to be limited to only top studios and artists. Thanks to a number of recent technological developments (not the least of which is Sound Tools) the entire process has been simplified, de-mystified and has become down right affordable. Read on to find out how Sound Tools can be used to create your own compact discs.

Let's assume that your final musical creation is destined to be distributed on compact disc. First, you'll want to mix your material to DAT. You may find that you need to edit or "tweak" your individual tunes, before assembling your pre-master. Here's how it works:

Final Editing

Once you have your final stereo mix, you may still want to polish up individual tunes before pre-mastering. We'll call this the final edit pass. For example, the guitar solo on the second song isn't as bright as you like. Run it through the EQ module to correct it digitally, with no signal degradation. If the chorus in one song is too loud, just adjust the level in the playlist, and use your own custom designed fade for a natural transition into the next section. Want to move the drum solo to the end of the song? Simply select it, name it as a region, and slide that region to the end of your playlist. These are just a few of the ways Sound Tools can help you polish your final mix.

Assembling the Pre-Master

Once you're satisfied with each individual cut (levels, EQ, arrangement, fades) you're ready to assemble your pre-master. Using our Master List™ software, simply load in your soundfiles, playlists or regions in the order they will occur on the final CD. The stop time of each piece will be determined by its length. Master List allows you to easily create space between tracks appropriate to your material. Because the standard sampling rate for CDs is 44.1 kHz, your sound files should all be recorded at that rate. If they're recorded at 48 kHz, you can convert them to 44.1 kHz with Sound Tools.

If you're planning to transfer this final mix to DAT as a CD pre-master to be processed by Optical Media International (via CD Express) you'll want to start your Master List at 0:00:00.00 with the 1 kHz sine wave file included with Master List (used for synchronization). Your material should begin at 0:01:00.00. Exactly one minute after the end of your material, place another 1 kHz sine wave file. If you're not using CD Express, contact your mastering house or CD plant for their preferred sync information.

Once you have your individual tunes arranged in Master List with the correct sync information and your offsets, you're ready to transfer your final arrangement to DAT, using your Digital Interface. That's it! Your DAT recording is now a pre-master and ready for mastering.

The Mastering Process

Mastering options are rapidly changing – to your advantage. As of this writing, all CD pressing plants still require a Sony 1630 3/4" U-matic tape to create the glass master. The 1630 is basically a video tape with your digital audio on the video track and time code on audio track two. Audio track one is reserved for the PQ codes, which allow CD players to detect the stop and start time of your tracks. There are several methods available to get to the 1630 step:

Multitrack/Two track → 1630 → Glass master

Mix directly to 1630. Not all studios are equipped with this system (around $40,000) and there are those who believe that the 1630 tape itself is not the most reliable media for your master (it's subject to dropouts). Also, unless your 1630 machine is equipped with an AES/EBU interface, your editing options are limited, and your two track is the last creative step.

digidesign

Multitrack/Two track → Sound Tools → DAT → 1630 → Glass Master

Mix to DAT (with or without Master List). Using Sound Tools allows you to make final edits before generating a DAT master. The CD plant will take your DAT tape and transfer it to the 1630 for you and manually assign the PQ codes. This takes some of the control out of your hands, as the plant determines the transitions between your songs. You can expect to typically pay $250–$375 per pre-master for conversion to the 1630.

Multitrack/Two track → Sound Tools → Master List DAT → 1630 → Glass Master

Mix to DAT with Master List, and use CD Express. OMI will take your "Master Listed" DAT cassette and through their proprietary process, automatically generate the PQ codes on the 1630. This saves you both time and money, while giving you more control over the final product. If you plan to create several CD masters, the CD Express service will pay back your entire Sound Tools investment after several projects. Of course, you can also use this method with a standard service, and your Master List document will give the plant guidelines for the final CD.

From the glass master, the individual CDs are pressed. You can contract with the mastering house, the plant, or OMI to handle all steps for you (including artwork and packaging), or you can negotiate with each vendor and handle each step yourself. Typical prices from major US pressing plants range from $1.55 to $2.50 per disc, including jewel case and one-color printing for 1000 discs. One nice advantage to using OMI's CD Express Service is the lack of high minimum quantities. The cost per disc of smaller orders (less than 1000) is quite reasonable, which makes it a good choice for personal pressings as well as commercial releases.

Although the 1630 is still the standard source material for pressing plants, there are several trends developing. In the not too distant future, plants will accept a time code encoded DAT cassette produced on one of a growing number of DAT machines equipped with SMPTE time code. Perhaps even more exciting is the future of write-once compact discs, which may eventually replace the glass master.

About Desktop CDs

There are a number of write-once destop CD Recorders available today. Yamaha has had a system on the market for about two years, and Sony has recently introduced their own system, the CD Writer. While still costly, these systems will eventually be widely used to create a desktop CD production system that will create CD Audio or CD ROM discs one at a time directly from Sound Tools – with no tape involved! The blank media sells for about $40/disc and the process takes place in real time. These systems are primarily used to press reference discs for clients who want to test the CD before pressing or for a limited (although costly) run of audio CDs or CD ROM discs.

For those of you who own studios, it will soon become feasible to acquire your own CD production system. Consider the appeal of offering your studio client a take-away CD – after all, your studio provides the equipment and expertise to create a state of the art digital recording. Why send the client away with a mere cassette when you can offer them a compact disc?

Equipment Required

- Sound Tools equipped with Digital Interface (Analog or Pro I/O™ Analog Interface optional);
- DAT recorder (must record at 44.1 kHz, and offer S/PDIF or AES/EBU digital I/O);
- Master List;™
- High quality DAT cassette(s);
- Macintosh II;
- High capacity hard disk drive such as ProStore™

For More Information

- CD Express, service of Optical Media International, 408.395.4223
- "Sound Tools, Time Code and CD Mastering" by Bob Katz, 1989

Selected CDs Mastered with Sound Tools

- Chesky Records (using Version 2.0) approximately 20 titles, including Clark Terry, David Chesky, Phil Woods Little Big Band, Greig Concerti, London National Symphony
- Omega/Vanguard Complete Set of Mahler Symphonies
- Musical Heritage Society Leon Thomas, Archie Edwards
- Hot Mix Radio Network Weekly radio show distributed on compact disc by ABC

Selected Sound Tools Users

- CBS Records
- Arista Records
- LA Studios
- Village Recorders
- ABC TV
- Cherokee Studios
- Russian Hill Recorders
- Fantasy Studios
- Chicago Recording Company
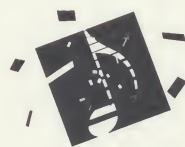
digidesign
1360 Willow Rd. #101
Menlo Park
California 94025
415.688.0600

Pro Store

Rack Mounted 660 Megabyte Hard Disk Drive

The Pro Store™ is a high speed rack mounted 660 megabyte SCSI hard drive designed for use with Digidesign's Sound Tools™ and Audiomedia™ direct to disk digital recording and editing systems. Featuring high performance and quiet operation, sturdy rack mounting, and a five year warranty, the Pro Store is ideal for use in the professional studio and is compatible with any SCSI-equipped Macintosh® and all Digidesign products.

With a 660 megabyte capacity, the Pro Store can store over an hour's worth of CD-quality (44.1 kHz) digital audio, making it perfect for CD mastering, soundtracks, and other audio production applications. Exceptionally fast, efficient data transfer rate and access speed guarantee flawless recording and playback of soundfiles. And Pro Store's whisper fan makes it one of the quietest hard disk drives available for the studio environment.

Backed with Digidesign's five year warranty, the Pro Store is the smart choice for high quality, reliable storage on the Macintosh.

Features

- 19" rack mount, 2U high
- Quiet fan
- Front panel power switch
- Hewlett Packard mechanism
- High performance formatting software
- Formatted capacity: 663.8 megabytes
- Transfer rate: 20 megabits per second
- Access time: 16.5 milliseconds
- SCSI ID switch on back of enclosure
- Nine (9) foot SCSI cable
- Compatible with any SCSI-equipped Macintosh
- Five year warranty